No. 739,476. PATENTED SEPT. 22, 1903.

C. E. BECKER.

CUSHION TRUSS FOR CYCLES.

APPLICATION FILED DEC. 26, 1902.

NO MODEL.

Fig. 1.

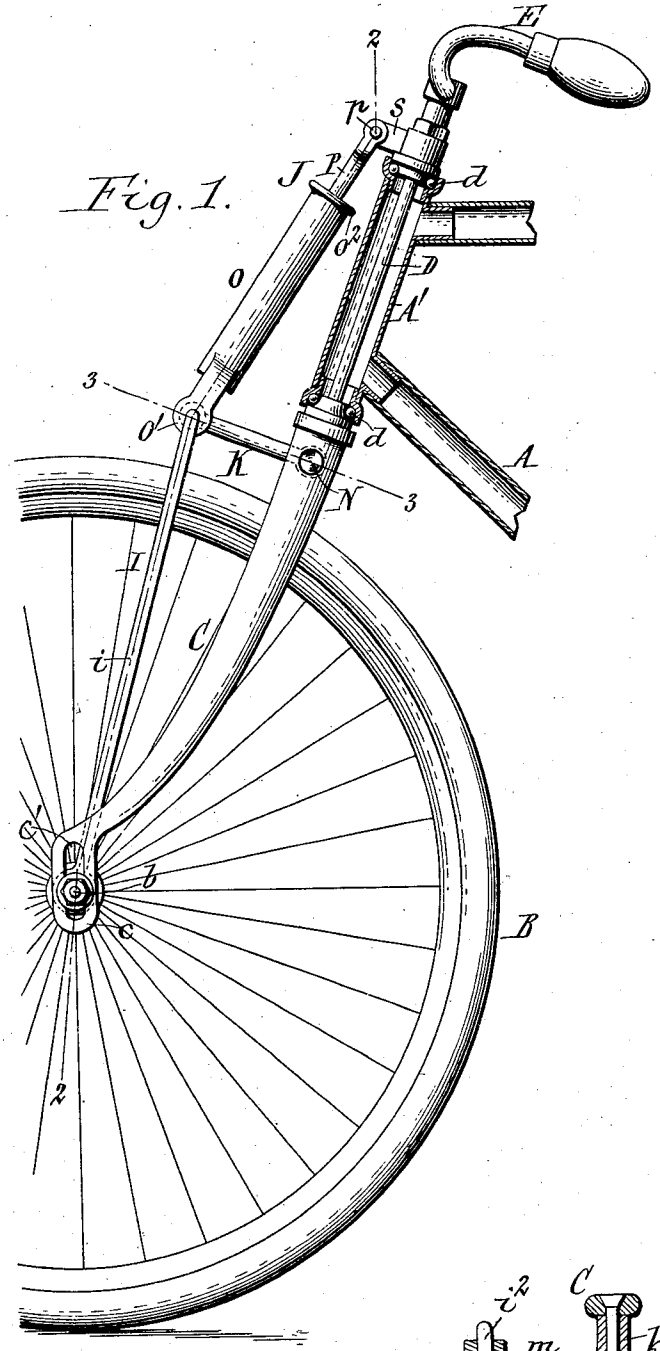


Fig. 2.

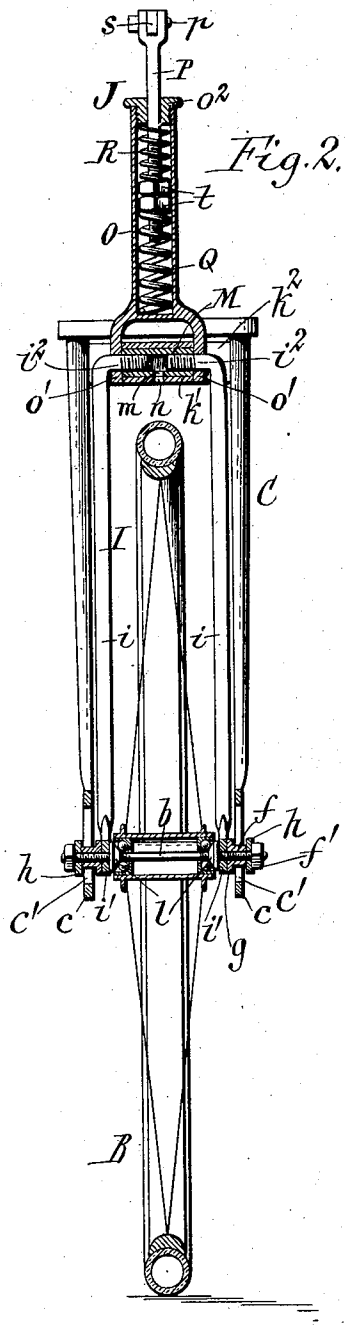
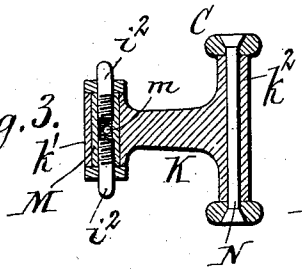


Fig. 3.



Witnesses:
Robert Weitknecht
Emma M. Graham.

Clarence E. Becker,
Inventor
By Geyer & Popp
Attorneys

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 739,476. Patented September 22, 1903.

UNITED STATES PATENT OFFICE.

CLARENCE E. BECKER, OF BUFFALO, NEW YORK, ASSIGNOR TO E. R. THOMAS MOTOR COMPANY, OF BUFFALO, NEW YORK.

CUSHION-TRUSS FOR CYCLES.

SPECIFICATION forming part of Letters Patent No. 739,476, dated September 22, 1903.

Application filed December 26, 1902. Serial No. 136,563. (No model.)

To all whom it may concern:

Be it known that I, CLARENCE E. BECKER, a citizen of the Dominion of Canada, residing at Buffalo, in the county of Erie and State of New York, have invented new and useful Improvements in Cushion-Trusses for Cycles, of which the following is a specification.

This invention relates to a cushion-truss which is more particularly designed for use in connection with the steering wheel and fork of a motor-bicycle, although the same may also be applied to other kinds of vehicles, such as velocipedes, automobiles, &c.

The object of this invention is to produce a combined cushioning and trussing device for this purpose which is of simple and durable construction, which reduces the jar upon the cycle to a minimum, and which braces or trusses the steering-fork, so as to relieve the strain on the same and on the bearings in the steering-head.

In the accompanying drawings, Figure 1 is a fragmentary sectional elevation showing my improved cushioning and trussing device applied to the steering fork and wheel of a cycle. Fig. 2 is a vertical cross-section of the same in line 2 2, Fig. 1. Fig. 3 is a horizontal cross-section in line 3 3, Fig. 1.

Similar letters of reference indicate corresponding parts throughout the several views.

A represents the front part of a cycle-frame having a steering-head A'; B, the steering-wheel; C, the steering-fork, which straddles the wheel; D, the pivot-spindle, journaled by ball-bearings *d* in the steering-head and connected at its lower end to the upper end of the steering-fork, and E the handle-bar, secured to the upper end of the spindle. All of these parts may be of any suitable and well-known construction.

The axle *b* of the wheel is guided on the lower ends of the side members of the steering-fork, so that these parts are capable of moving relatively to each other in a vertical plane. For this purpose the lower end of each fork side is provided with an ear *c*, having a vertical slot *c'*, and each end of the wheel-axle is provided with a sleeve *f*, arranged in the slot of one of said ears. The corresponding ear and sleeve are held against lateral displacement with reference to each other by a flange or shoulder *g*, arranged at the inner end of the sleeve and facing the inner side of the ear, and a disk or washer *h*, arranged on the axle at the outer end of the sleeve and forming a shoulder which faces the outer side of said ear. The sleeve and washer are confined on the axle by a screw-nut *f'* on the outer end of the same.

I J represent the lower and upper ties, and K the strut, of a cushion-truss, whereby the wheel-axle, the steering-fork, and the spindle are yieldingly connected. The lower end of the lower tie is connected with the axle, the upper end of the upper tie is connected with the upper end of the spindle, and the strut connects the opposing ends of the upper and lower ties with the upper end of the steering-fork. The lower tie I consists of two upright rods *i*, arranged on opposite sides of the wheel and each provided at its lower end with an eye *i'*, which is mounted on one end of the axle between the sleeve *f* and the cone *l* of the ball-bearing on the respective end of the axle. At its upper end each rod of the lower tie is provided with a screw-threaded horizontal shank or pivot i^2. The shanks of both tie-rods project inwardly and are screwed into opposite ends of a horizontal coupling-sleeve M. The strut K is preferably constructed in the form of a link having transverse sleeves or tubular pivots k' k^2 at its front and rear ends. The coupling-sleeve of the tie-rods is journaled in the front pivot-sleeve k' of the strut, while the rear sleeve k^2 of the same is arranged between the side members of the steering-fork above the wheel and is journaled on a horizontal pin or bolt N, connecting said members.

The upper tie J of the truss is constructed in the form of a telescopic spring-cushion and consists, essentially, of a tubular spring-casing O, a tension-rod P, a main or cushioning spring Q, and a buffer-spring R. The casing is provided at its lower end with two perforated lugs or eyes *o'*, which straddle the ends of the coupling-sleeve and the front pivot-sleeve of the strut and which receive the shanks of the lower tie-rods, thereby forming a pivotal connection between the opposing ends of the upper and lower ties and the front end of the strut. In connecting the lower

tie-rods, the strut, and the spring-casing the coupling-sleeve is first placed in the front strut-sleeve, the lugs of the spring-casing are then placed against opposite ends of the coupling and front strut-sleeves, and then the shanks of the lower tie-rods are passed through the spring-casing lugs and screwed into opposite ends of the coupling-sleeve. The latter is held against turning while the shanks are being screwed into the same by a suitable pin or holding-tool, which is inserted in coinciding openings *m n*, formed in the side of the coupling and front strut-sleeves.

At its upper end the casing is provided with a screw plug or cap o^2, having a central opening. In this opening the tension-rod P is guided and is arranged at its lower end within the casing, while its upper end is pivoted by a transverse screw or pin *p* to a forwardly-projecting bracket *s*, which is secured to the steering-spindle above the steering-head. Within the casing the tension-rod is provided with upwardly and downwardly facing shoulders, which are preferably formed by screw-nuts *t*, arranged on the tension-rod. The cushioning-spring is arranged between the lower shoulder of the tension-rod and the bottom of the casing, and the buffer-spring is arranged between the upper shoulder of the tension-rod and the cap of the casing. The cushioning-spring is made sufficiently strong to sustain the heaviest load which the cycle is designed to carry; but the buffer-spring is made comparatively light, as the same merely serves to prevent jarring of the cycle during the recoil or expansion of the cushioning-spring. As the load on the cycle-frame depresses the same relatively to the steering-wheel or if the latter in passing over an elevation is raised with reference to the cycle-frame the cushioning-spring is compressed more or less, thereby relieving the cycle of any undue strain and also avoiding sudden jars, whereby riding of the cycle is rendered comfortable and easy. As the cushioning-spring expands the buffer-spring is compressed between the upper shoulder of the tension-rod and the cap of the spring-casing, thereby avoiding the jar which would occur during the expansion of the cushioning-spring if the upward movement of the tension-rod were limited by rigid stop on the spring-casing. During the vertical movement of the wheel and steering-fork with reference to each other the axle moves up or down in the guide-slots of the fork, whereby these parts are held against displacement. As the rods of the lower tie and the spring-casing of the upper tie move upwardly and downwardly the strut oscillates on the steering-fork and adapts itself to the variations in the positions of the same.

By constructing the cycle-cushioning device in the form of a truss the extreme ends of which are connected with the wheel-axle and the upper end of the steering-spindle, while its intermediate part is connected with the fork at its junction with the lower end of the spindle, the steering mechanism of the cycle is reinforced and breaking of the same between the steering fork and spindle is avoided. This construction of cushioning device is particularly desirable for motor-cycles, as it permits of making the frame comparatively light without liability of breaking the fork owing to the additional weight of the motor.

By connecting the trussed cushioning device with the upper and lower ends of the steering-spindle the lateral strain and wear on the bearings in the steering-head are reduced to a minimum. Furthermore, this construction of the cushioning device is such that the wheel cannot tilt laterally in the steering-fork, but is guided so that it is compelled to move parallel with the steering-fork, thereby effectually maintaining the parts in alinement and insuring reliable steering of the cycle.

I claim as my invention—

1. The combination of a frame, having a fork, a wheel having its axle movably connected with the fork, and a cushion-truss consisting of a strut movably connected with the fork, a lower tie extending from the strut downwardly to the wheel-axle, a bracket or attachment arranged on the machine above the strut, and an upper tie extending from the strut to said attachment, one of said ties being elastic, substantially as set forth.

2. The combination of a frame provided with a steering-head, a fork pivoted in the steering-head, a wheel having its axle movably connected with the lower end of the fork, and a cushion-truss consisting of a lower tie connected with the wheel-axle, an upper tie connected with the fork-pivot above the steering-head, and a strut movably connecting the opposing ends of the upper and lower ties with the upper part of the fork, one of said ties being elastic, substantially as set forth.

3. The combination of a frame, a fork pivoted on said frame, a wheel having its axle guided on the lower ends of the fork, and a cushioning device consisting of a lower tie connected with the axle, an upper elastic tie connected with the fork-pivot and a strut pivotally connecting the opposing ends of the upper and lower ties and the upper part of the fork, substantially as set forth.

4. The combination of a frame provided with a steering-head, a fork provided at its lower ends with vertical guides and at its upper end with a spindle which is journaled in said head, a wheel having its axle movable vertically in said guides, and a cushioning device consisting of a lower tie connected with the axle, an upper elastic tie pivotally connected with the spindle above the steering-head, and a strut pivotally connecting the opposing ends of the upper and lower ties with the upper part of the fork, substantially as set forth.

5. The combination of a frame provided with a steering-head, a fork provided at its upper end with a spindle journaled in said

head, ears arranged at the lower ends of the fork sides and each provided with a vertical slot, a wheel arranged in said fork and having its axle guided in said slots, and a cushioning device consisting of two lower tie-rods connected at their lower ends with said axle and each provided at its upper end with a horizontal screw-shank, a screw coupling-sleeve connecting said shanks, a link pivoted on the upper part of the fork and provided with a pivot-sleeve in which said coupling-sleeve is journaled, and a spring-tie pivotally connecting the upper ends of said rods with the upper end of said spindle, substantially as set forth.

6. The combination of a frame provided with a steering-head, a fork provided at its upper end with a spindle journaled in said head, ears arranged at the lower ends of the fork sides and each provided with a vertical slot, a wheel arranged in said fork and having its axle guided in said slots, and a cushioning device consisting of two lower tie-rods connected at their lower ends with said axle and each provided at its upper end with a horizontal screw-shank, a screw coupling-sleeve connecting said shanks, a link pivoted on the upper part of the fork and provided with a pivot-sleeve in which said coupling-sleeve is journaled, a tubular casing pivoted at its lower end to said shank, a tension-rod arranged at its lower end in said casing and pivoted at its upper end to the upper end of said spindle, and a spring arranged in said casing between the bottom thereof and a shoulder on the tension-rod, substantially as set forth.

7. The combination of a frame provided with a steering-head, a fork provided at its upper end with a spindle journaled in said head, ears arranged at the lower ends of the fork sides and each provided with a vertical slot, a wheel arranged in said fork and having its axle guided in said slots, and a cushioning device consisting of two lower tie-rods connected at their lower ends with said axle and each provided at its upper end with a horizontal screw-shank, a screw coupling-sleeve connecting said shanks, a link pivoted on the upper part of the fork and provided with a pivot-sleeve in which said coupling-sleeve is journaled, a heavy spring arranged in said casing between the bottom thereof and a shoulder on the tension-rod, and a light spring arranged in the casing between the top thereof and another shoulder on the tension-rod, substantially as set forth.

8. The combination of a frame provided with a steering-head, a fork provided at its upper end with a spindle journaled in said head, ears arranged at the lower ends of the fork sides and each provided with a vertical slot, a wheel arranged in said fork and having its axle guided in said slots, and a cushioning device consisting of two lower tie-rods connected at their lower ends with said axle and each provided at its upper end with a horizontal screw-shank, a screw coupling-sleeve connecting said shanks, a link pivoted on the upper part of the fork and provided with a pivot-sleeve in which said coupling-sleeve is journaled, a tubular casing provided at its upper end with a screw-cap and at its lower end with two eyes which receive said shanks at opposite ends of the pivot and coupling sleeves, a tension-rod extending through said cap and provided at its lower end with screw-nuts, a heavy spring arranged in the casing between the bottom thereof and said nuts, a light spring arranged in the casing between the cap thereof and said nuts, and a bracket which is secured to said spindle above the steering-head and to which the upper end of the tension-rod is pivoted, substantially as set forth.

Witness my hand this 23d day of December, 1902.

CLARENCE E. BECKER.

Witnesses:
E. K. ASBEL,
THEO. L. POPP.